PATIENT SIMULATOR MANIKIN AND SYSTEM

FIELD OF THE INVENTION

The present invention relates to medical training simulators, and in particular relates to a patient simulator manikin and system for simulating a fluid flow condition within a fluid carrying body cavity.

BACKGROUND OF THE INVENTION

Patient simulator manikins have proven a useful element in health care training, especially for emergency procedures such as resuscitation.

Various different forms of patient simulator manikins have been developed to assist in such emergency training. The available simulators range from relatively simple and inexpensive manikins useful for basic "part task" training, such as that disclosed in U.S. Pat. No. 6,227,864 assigned to Asmund S, Laerdal A/S. The simulator disclosed provides a simulation of the torso, head, trachea and lungs for practicing cardiopulmonary resuscitation. The manikin disclosed is static, and somewhat unrealistic. Other available is patient simulator manikins utilise complex computer controlled systems to provide more realistic environments, as disclosed for example in U.S. Pat. No. 6,273,728 assigned to the University of Florida. Such complex manikins, whilst being realistic, are typically extremely complex and prohibitively expensive.

OBJECT OF THE INVENTION

It is an object of the present invention to overcome or substantially ameliorate at least one of the above disadvantages.

SUMMARY OF THE INVENTION

In one aspect the present invention provides a system for simulating a fluid flow condition within a fluid carrying body cavity comprising:

an elastically deformable bladder simulating said body cavity and mounted to the body of a patient simulator manikin,

a pressurised fluid supply,

an inlet tube communicating said pressurized fluid supply with said bladder,

a valve for enabling/disabling flow of fluid through said inlet tube from said pressurised fluid supply to said bladder,

a controller for controlling said valve based on said simulated fluid flow condition,

an outlet for venting fluid from said bladder,

an inlet flow restrictor for restricting flow of said fluid through said inlet tube and

an outlet flow restrictor associated with said outlet for restricting flow of said fluid through said outlet.

Typically, said valve consists of a solenoid valve.

Typically, said controller comprises:

an operator input terminal for inputting said simulated flow condition, and

a processor for converting said input simulated flow condition into a control signal to open/close said valve.

In one form, said bladder simulates a lung and is mounted within a chest cavity of said manikin.

Typically, where said bladder simulates a lung, said input simulated flow condition is a respiratory rate and said control signal periodically opens and closes said valve means at a cyclic rate corresponding to said input respiratory rate.

Preferably, said control signal provides a substantially constant ratio of valve opening time to valve closing time irrespective of said respiratory rate.

Preferably, said substantially constant ratio is approximately 1:5.

Said system may include two including two said lung simulating bladders mounted side by side within said chest cavity, each said bladder having a said inlet tube valve outlet and outlet flow restrictor associated therewith.

In a preferred form, said system further simulates a pneumothorax condition, said controller further having a pneumothorax input, said controller closing the valve associated with one of said bladders on activation of said pneumothorax input whilst retaining cyclic opening and closing of the valve associated with the other of said bladders.

In another form, said bladder simulates a blood vessel and is mounted adjacent the outer surface of said manikin.

Said blood vessel simulating bladder is typically in the form of a distensible tube sealed at a distal end thereof.

Said blood vessel simulating bladder may simulate a brachial, umbilical or carotid blood vessel.

Typically, where said bladder simulates a blood vessel, said input flow condition is a pulse rate and said control signal periodically opens and closes said valve at a cyclic rate corresponding to said input pulse rate.

Preferably, said control signal provides a constant valve opening time for each cycle irrespective of said pulse rate, said valve closing time varying as said pulse rate is varied.

Preferably, said constant valve opening time is approximately 0.15 seconds.

Additionally, where said bladder simulates a pulse rate in a brachial blood vessel, said system further simulates blood pressure, said operator input terminal further having a blood pressure input, said system further comprising a blood pressure sensing apparatus in the form of an inflatable cuff positionable over the limb containing said brachial blood vessel simulating bladder and a pressure sensor for measuring pressure within said cuff, said controller further comprising a comparator for comparing said cuff pressure with said input blood pressure, said controller generating a signal to close said valve when said cuff pressure exceeds said input blood pressure and to open and close said valve at said cyclic rate when said cuff pressure is less than said input blood pressure.

Said system may include one or two said lung simulating bladders and one or more said blood vessel simulating bladders, each said bladder having a said inlet tube valve outlet and outlet flow restrictor associated therewith.

In another aspect the present invention provides a patient simulator comprising:

a manikin body or body portion,

a system as defined above having at least one said bladder mounted to said body or body portion.

In one form, where at least one said lung simulating bladder is mounted within said chest cavity of said manikin body, said simulator further comprises an auxiliary lung simulating bladder mounted within said chest cavity either overlying or underlying said at least one lung simulating bladder, said auxiliary lung simulating bladder communicating with at least one of a mouth and nose of said manikin for simulation of externally assisted respiration.